

REMARKS

The claims have been amended to eliminate multiple dependency and to place them in better form for U.S. practice. Favorable action on the application is solicited.

Respectfully submitted,

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A handwritten signature in cursive script that reads "Herbert B. Keil".

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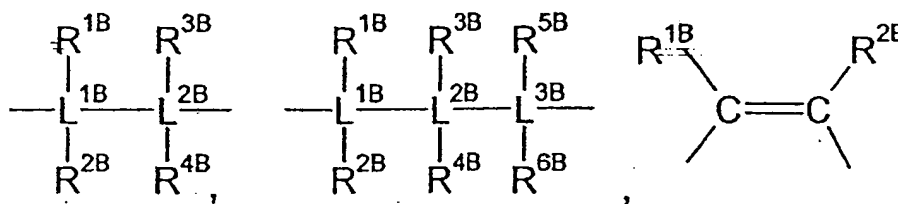
Encl.: Listing of Claims

COMPLETE LISTING OF CLAIMS

1. (original) A monocyclopentadienyl complex which contains the structural feature of the formula (Cp) (-Z-A)_mM (I), where the variables have the following meanings:

Cp is a cyclopentadienyl system,

Z is a bridge between A and Cp and is selected from the group consisting of



where

L^{1B}-L^{3B} are each, independently of one another, carbon or silicon,

R^{1B}-R^{6B} are each, independently of one another, hydrogen, C₁-C₂₀-alkyl, C₂-C₂₀-alkenyl, C₆-C₂₀-aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or SiR^{7B}₃, where the organic radicals R^{1B}-R^{6B} may also be substituted by halogens and two geminal or vicinal radicals R^{1B}-R^{6B} or a radical R^{1B}-R^{6B} and A may also be joined to form a five- or six-membered ring and

R^{7B} are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl or alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals R^{7B} may also be joined to form a five- or six-membered ring,

A is an unsubstituted, substituted or fused, heteroaromatic ring system,

M is a metal selected from the group consisting of titanium in the oxidation state 3, vanadium, chromium, molybdenum and tungsten and

m is 1, 2 or 3.

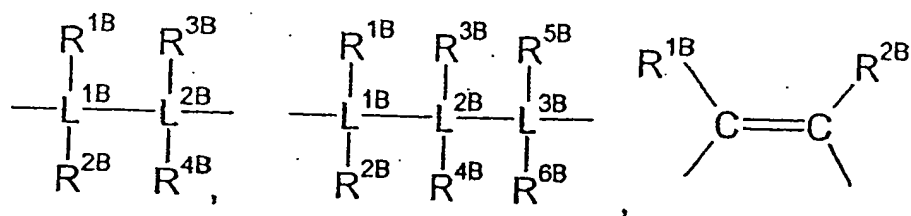
2. (original) A monocyclopentadienyl complex as claimed in claim 1 of the formula



where the variables have the following meanings:

Cp is a cyclopentadienyl system,

Z is a bridge between A and Cp and is selected from the group consisting of



where

$L^{1B}-L^{3B}$ are each, independently of one another, carbon or silicon,

$R^{1B}-R^{6B}$ are each, independently of one another, hydrogen, C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or SiR^{7B}_3 , where the organic radicals $R^{1B}-R^{6B}$ may also be substituted by halogens and two geminal or vicinal radicals $R^{1B}-R^{6B}$ may also be joined to form a five- or six-membered ring and

R^{7B} are each, independently of one another, hydrogen, C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl or alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals R^{7B} may also be joined to form a five- or six-membered ring,

A is an unsubstituted, substituted or fused, heteroaromatic ring system,

M is a metal selected from the group consisting of titanium in the oxidation state 3, chromium, molybdenum and tungsten,

m is 1, 2 or 3,

X are each, independently of one another, fluorine, chlorine, bromine, iodine, hydrogen, C_1-C_{10} -alkyl, C_2-C_{10} -alkenyl,

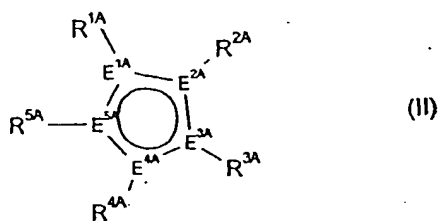
C₆-C₂₀- aryl, alkylaryl having 1-10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, NR¹R², OR¹, SR¹, SO₃R¹, OC(O)R¹, CN, SCN, β-diketonate, CO, BF₄⁻, PF₆⁻ or a bulky noncoordinating anion,

R¹-R² are each, independently of one another, hydrogen, C₁-C₂₀-alkyl, C₂-C₂₀-alkenyl, C₆-C₂₀-alkenyl, C₆-C₂₀-aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, SiR³₃, where the organic radicals R¹-R² may also be substituted by halogens and two radicals R¹-R² may also be joined to form a five- or six-membered ring,

R³ are each, independently of one another, hydrogen, C₁-C₂₀-alkyl, C₂-C₂₀-alkenyl, C₆-C₂₀-aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals R³ may also be joined to form a five- or six-membered ring and

k is 1, 2 or 3.

3. (currently amended) A monocyclopentadienyl complex as claimed in claim 1 or 2, wherein the cyclopentadienyl system Cp has the formula (II):

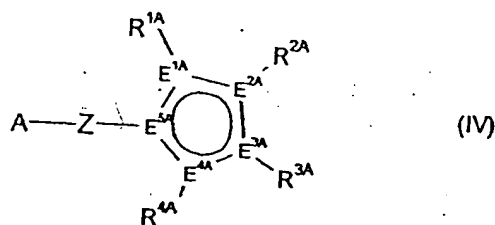


where the variables have the following meanings:

- $E^{1A}-E^{5A}$ are each carbon or not more than one $E^{1A}-E^{5A}$ is phosphorus,
- $R^{1A}-R^{5A}$ are each, independently of one another, hydrogen, C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, NR^{6A}_2 , $N(SiR^{6A}_3)_2$, OR^{6A} , $OSiR^{6A}_3$, SiR^{6A}_3 , BR^{6A}_2 , where the organic radicals $R^{1A}-R^{5A}$ may also be substituted by halogens and two vicinal radicals $R^{1A}-R^{5A}$ may also be joined to form a five- or six-membered ring, and/or two vicinal radicals $R^{1A}-R^{5A}$ are joined to form a heterocycle which contains at least one atom from the group consisting of N, P, O and S, and where 1, 2 or 3 substituents $R^{1A}-R^{5A}$ is a group-Z-A and
- R^{6A} are each, independently of one another, hydrogen, C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl radical and 6-20 carbon atoms in the aryl radical and two geminal radicals R^{6A} may also be joined to form a five- or six-membered ring.

4. (currently amended) A monocyclopentadienyl complex as claimed in claim 1 any of ~~claims 1 to 3~~, wherein the cyclopentadienyl system Cp together with-Z-A has

the formula (IV):

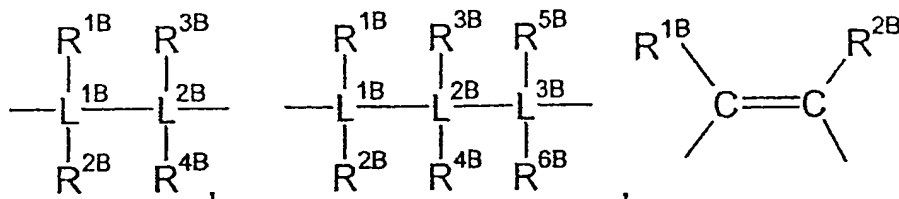


where the variables have the following meanings:

$E^{1A}-E^{5A}$ are each carbon or at most one E^{1A} to E^{5A} is phosphorus,
 $R^{1A}-R^{4A}$ are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, NR^{6A}_2 , $N(SiR^{6A})_3$, OR^{6A} , $OSiR^{A3}$, SiR^{A3} , where the organic radicals $R^{1A}-R^{4A}$ may also be substituted by halogens and two vicinal radicals $R^{1A}-R^{4A}$ may also be joined to form a five- or six-membered ring, and/or two vicinal radicals $R^{1A}-R^{4A}$ may be joined to form a heterocycle containing at least one atom from the group consisting of N, P, O and S,

R^{6A} are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl, alkylaryl, having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two geminal radicals R^{6A} may also be joined to form a five- or six-membered ring[.],

A is an unsubstituted, substituted or fused, heteroaromatic ring system,
 Z is a bridge between A and Cp and is selected from the group consisting of



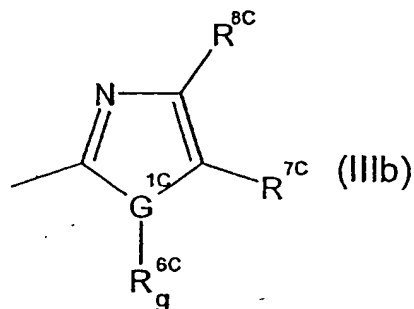
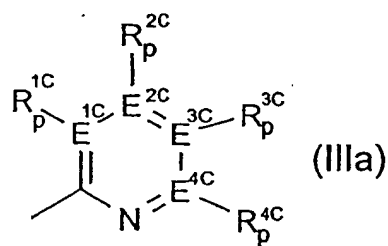
where

L^{1B} - L^{3B} are each, independently of one another, carbon or silicon,

R^{1B} - R^{6B} are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or SiR^{7B}_3 , where the organic radicals R^{1B} - R^{6B} may also be substituted by halogens and two geminal or vicinal radicals R^{1B} - R^{6B} may also be joined to form a five- or six-membered ring and

R^{7B} are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl or alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals R^{7B} may also be joined to form a five- or six-membered ring.

5. (currently amended) A monocyclopentadienyl complex as claimed in claim 1 ~~any of claims 1 to 4~~, wherein A has the formula (IIIA) or (IIIB) :



where the variables have the following meanings:

$E^{1C}-E^{4C}$ are each carbon or nitrogen,

$R^{1C}-R^{4C}$ are each, independently of one another, hydrogen, C_1-C_{20} -alkyl,

C_2-C_{20} -alkenyl, C_6-C_{20} -aryl, alkylaryl having from 1 to 10

carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl

part or SiR^{5C}_3 , where the organic radicals $R^{1C}-R^{4C}$ may also be

substituted by halogens or nitrogen and further C_1-C_{20} -alkyl,

C_2-C_{20} -alkenyl, C_6-C_{20} -aryl, alkylaryl having from 1 to 10

carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl

part or SiR^{5C}_3 groups and two vicinal radicals $R^{1C}-R^{4C}$ or R^{1C}

and Z may also be joined to form a five- or six-membered ring and

R^{5C} are each, independently of one another, hydrogen, C_1-C_{20} -alkyl,

C_2-C_{20} -alkenyl, C_6-C_{20} -aryl or alkylaryl having from 1 to 10

carbon atoms in the alkyl part and 6-20 carbon atoms

in the aryl part and two radicals R^{5C} may also be joined to form

a five- or six-membered ring and

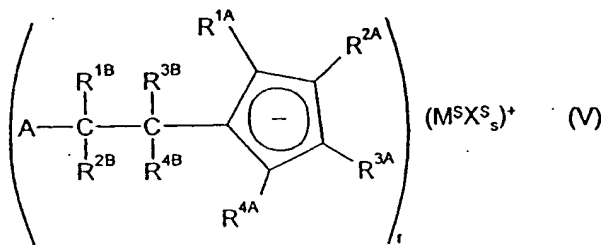
p is 0 when $E^{1C}-E^{4C}$ is nitrogen and 1 when $E^{1C}-E^{4C}$ is carbon,
 G^{1C} is nitrogen, phosphorus, sulfur or oxygen,
 $R^{6C}-R^{8C}$ are each, independently of one another, hydrogen, C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or SiR^{9C}_3 , where the organic radicals $R^{6C}-R^{8C}$ may also be substituted by halogens or nitrogen and C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or SiR^{9C}_3 groups and two vicinal radicals $R^{6C}-R^{8C}$ or R^{6C} and Z may also be joined to form a 5- or 6-membered ring and

R^{9C} are each, independently of one another, hydrogen C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl or alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals R^{9C} may also be joined to form a five- or six-membered ring and

g is 0 when G^{1C} is sulfur or oxygen and 1 when G^{1C} is nitrogen or phosphorus.

6. (currently amended) A monocyclopentadienyl complex as claimed in claim 1 ~~any of claims 1 to 5~~, wherein Z is selected from the group consisting of $-C(R^{1B}R^{2B})-$, $Si(R^{3B}R^{4B})-$, $-CH_2-C(R^{3B}R^{4B})-$ and 1,2-phenylene.

7. (currently amended) A catalyst system for olefin polymerization comprising
 - A) at least one monocyclopentadienyl complex as claimed in claim 1 ~~claims 1 to 6~~,
 - B) optionally, an organic or inorganic support,
 - C) optionally, one or more activating compounds,
 - D) optionally, further catalysts suitable for olefin polymerization and
 - E) optionally, one or more metal compounds containing a metal of group 1, 2 or 13 of the Periodic Table.
8. (original) A prepolymerized catalyst system comprising a catalyst system as claimed in claim 7 and one or more linear C₂-C₁₀-1-alkenes polymerized onto it in a mass ratio of from 1: 0.1 to 1: 1 000 based on the catalyst system.
9. (currently amended) The use of a catalyst system as claimed in claim 7 ~~or 8~~ for the polymerization or copolymerization of olefins.
10. (currently amended) A process for preparing polyolefins by polymerization or copolymerization of olefins in the presence of a catalyst system as claimed in claim 7 ~~or 8~~.
11. (original) A process for preparing cyclopentadienyl systems of the formula (V):



where the variables have the following meanings:

$R^{1A}-R^{4A}$ are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, NR^{6A}_2 , $N(SiR^{6A}_3)_2$, OR^{6A} , $OSiR^{6A}_3$, SiR^{6A}_3 , where the organic radicals $R^{1A}-R^{4A}$ may also be substituted by halogens and two vicinal radicals $R^{1A}-R^{4A}$ may also be joined to form a five- or six-membered ring, and/or two vicinal radicals $R^{1A}-R^{4A}$ are joined to form a heterocycle which contains at least one atom from the group consisting of N, P, O and S[[.]] ,

R^{6A} are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two geminal radicals R^{6A} may also be joined to form a five- or six-membered ring,

A is an unsubstituted, substituted or fused, heteroaromatic ring system,

$R^{1B}-R^{4B}$ are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or SiR^{7B}_3 , where the organic radicals $R^{1B}-R^{4B}$ may also be substituted by halogens and two geminal vicinal radicals $R^{1B}-R^{4B}$ may also be joined to form a five- or six- membered ring and

R^{7B} are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl or alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals R^{7B} may also be joined to form a five- or six-membered ring,

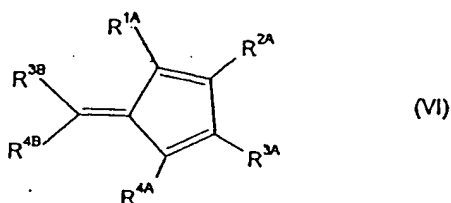
M^S a metal of group 1, 2 or 3 of the Periodic Table of the Elements,

X^S are each, independently of one another, fluorine, chlorine, bromine, iodine, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl, alkylaryl having 1-10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, NR^1R^2 , OR^1 , SR^1 , SO_3R^1 , $OC(O)R^1$, CN , SCN , β -diketonate, CO , BF_4^- , PF_6^- or a bulky noncoordinating anion and

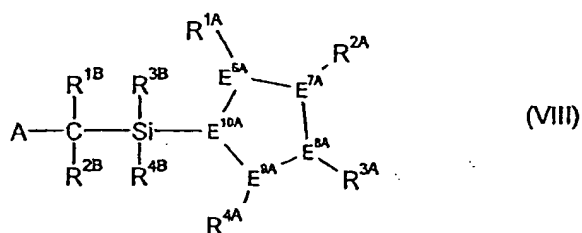
s 0, 1 or 2,

r 1 or 2, with the proviso that $s + r$ is the oxidation state of $M^S - 1$,

which comprises reacting $(A-CR^{1B}R^{2B})_r (M^S X^S)^+$ with a fulvene of the formula (VI)



12. (original) A process for preparing cyclopentadienyl systems of the formula (VIII):



where the variables have the following meanings:

$E^{6A}-E^{10A}$ are each carbon or not more than one E^{6A} to E^{10A} is phosphorus, where four adjacent $E^{6A}-E^{10A}$ form a conjugated diene system and the remaining $E^{6A}-E^{10A}$ additionally bears a hydrogen atom,

$R^{1A}-R^{4A}$ are each, independently of one another, hydrogen, C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, NR^{6A}_2 , $N(SiR^{6A}_3)_2$, OR^{6A} , $OSiR^{6A}_3$, SiR^{6A}_3 , where the organic radicals $R^{1A}-R^{4A}$ may also be substituted by halogens and two vicinal radicals $R^{1A}-R^{4A}$ may also be joined to form a five- or six-membered ring, and/or two vicinal radicals $R^{1A}-R^{4A}$ are joined to form a heterocycle which contains at least one atom from the group consisting of N, P, O and S,

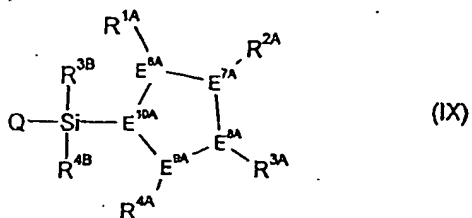
R^{6A} are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two geminal radicals R^{6A} may also be joined to form a five- or six-membered ring,

A is an unsubstituted, substituted or fused, heteroaromatic ring system,

R^{1A} - R^{4A} are each, independently of one another, hydrogen C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or SiR^{7B}_3 , where the organic radicals R^{1A} - R^{4A} may also be substituted by halogens and two geminal or vicinal radicals R^{1A} - R^{4A} may also be joined to form a five- or six-membered ring, and

R^{7B} are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl or alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals R^{7B} may also be joined to form a five- or six-membered ring,

which comprises reacting $(A-CR^{1B}R^{2B})_r(M^S X^S_s)^+$ with a cyclopentadienyl system of the formula (IX)



where the variables are as defined above and

Q is a leaving group.